WILFRED PLOMIS ET AL.

IBLA 87-61 et al. 1/ Decided August 22, 1988

Appeals from decisions of the Eastern States Office, Bureau of Land Management, rejecting oil and gas lease offers. ES 35014 et al. 2/

Affirmed.

1. Oil and Gas Leases: Known Geologic Structures

> A determination by BLM that lands are within a known geologic structure of a producing oil or gas field, which determination is based in part on aeromagnetic data, will not be disturbed in the absence of a showing of error by a preponderance of the evidence.

APPEARANCES: Dale E. Zimmerman, Esq., Jason R. Warran, Esq., James W. McDade, Esq., Washington, D.C., for appellants; Mary Katherine Ishee, Esq., Office of the Solicitor, Washington, D.C., for the Bureau of Land Manage- ment.

OPINION BY ADMINISTRATIVE JUDGE ARNESS

Wilfred Plomis, George Haymans III, and Peninsular Oil and Gas Company have appealed from decisions of the Eastern States Office, Bureau of Land Management (BLM), rejecting the noncompetitive oil and gas lease offers filed by each. Lands sought by appellants were determined by BLM to be within a known geologic structure (KGS) 3/ of a producing oil or gas field

1/ Appeals docketed as IBLA 87-61, 87-62, 87-243 through 246, 87-259, and 88-227 have been consolidated for review because of the similarities of issues involved.

2/ The docket numbers set forth in note 1 identify appeals from rejection of offers ES 35014, 34826, 35048, 35060, 35523, 35451, 35181, and 37826, respectively.

3/ Regulation 43 CFR 3100.0-5(l) (1987) defines a known geological struc- ture as "technically the trap in which an accumulation of oil or gas has been discovered by drilling and determined to be productive, the limits of which include all acreage that is presumptively productive." Upon pas- sage of the Federal Onshore Oil and Gas Leasing Reform Act of 1987, P.L. 100-203, 101 Stat. 1330-259, this concept was deleted from 30 U.S.C. | 226 (1982). Oil and gas lease applications and offers pending on Dec. 22, 1987, were, however, to be processed and leases issued under the provisions of the Act of Feb. 25, 1920, as in effect before its amendment by P.L. 100-203.

and, consequently, to be unavailable for noncompetitive leasing. In support of its decision, BLM cited 43 CFR 3110.3(a), which states:

> If, prior to the time a noncompetitive lease is issued, all or part of the lands in the offer are found to be within a known geological structure of a producing oil or gas field * * *, the offer shall be rejected in whole or in part as to such lands, as appropriate.

By memorandum of January 17, 1986, the Milwaukee District Manager, BLM, informed the Eastern States Director that the Newaygo-Mecosta KGS was effective as of December 25, 1985. Lands within this KGS totalled 363,260 acres, and appellants' offers described lands therein. BLM's memorandum stated that "[a] review of deep tests in Lake, Mason, Osceola, Oceana, Newaygo, Mecosta, Montcalm, Kent, and Muskegon Counties in Michigan has revealed that Prairie du Chien production is directly related to the geo- logic structure causing a very large negative magnetic anomaly." Review of this area had been occasioned, BLM explained, by recent over-the-counter applications and successful tests of the Prairie du Chien formation.

In general, appellants charge that BLM's finding that a structural elevation exists in the Prairie du Chien formation involves "such exten-sive speculation and uncertainty as to render any KGS determination legally improper" (Statement of Reasons (SOR), Dec. 2, 1987, at 22). BLM's KGS report does not refer to a "structural elevation," but instead speaks of a "basement high" which appears as a negative magnetic anomaly 4/ in an aeromagnetic survey of the Southern Peninsula of Michigan. The results of this survey are set forth in a magnetic anomaly map published in 1971 by Michigan Geological Survey. 5/

Appellants quote at length from Dr. Richard L. Kellogg, whose 1971 doctoral thesis, "Aeromagnetic Investigation of the Southern Peninsula of Michigan," describes the use of a magnetic survey:

> Both gravity and magnetic data are available for the Southern Peninsula of Michigan. Magnetic methods are preferred to gravity

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4/ BLM defines a magnetic anomaly in this way:

"Aeromagnetic survey data are measurements of the distortion of the earth's magnetic field generated by its interactions with rock units of the earth's crust. Correction factors must be applied to the raw survey data to remove background magnetic trends (regional magnetic field, etc.) and other noise. The remaining pattern of magnetic highs and lows are magnetic anomalies."
(BLM Response, Feb. 22, 1988, at 17).

5/ BLM's map #3 bears the following legend: "Magnetic data after Mich. [Department of Natural Resources] Report of Inv. #14 plate 2." Plate 2 is designated "Total Magnetic Intensity Anomaly Map of the Southern Peninsula of Michigan." Map #3 and Report of Investigation #14 are part of the KGS supporting documentation.

> methods when making depth determinations primarily because magnetic anomalies originating from within the basement are not distorted by anomalies from the overlying sediments as are gravity anomalies.

Id. at 47-48. Kellogg cautions that anomalies with a prominent minimum should be avoided because such may be indicative of factors that will result in error if the anomaly is interpreted according to standard theory. Kellogg further cautions that, because of the greater depth to basement in the central portion of Michigan, the reliability of contours based on anoma-lies there is less than it is in the northern and southern parts of the State. Id. at 50, 54.

In addition to these and other cautions 6/ expressed by Kellogg, appel-lants question BLM's KGS determination on the basis of a critical review by the Eastern States Office of the KGS report. 7/ This review suggested that the magnetic anomaly in question was attributable to a "kidney iron deposit" in a formation above the Prairie du Chien. Appellants also point out that the KGS report acknowledges BLM's failure to perform customary mathematical simulation and computer modelling in interpreting available magnetic data.

In response, BLM defends its KGS determination by stating that its use of aeromagnetic data was but a part of a geologic analysis of all avail-able data, which included well data, aeromagnetic and gravitational data, structure maps, isopachs, and previous analyses and models for the Michigan Basin. Its study was based on data from 180 wells, BLM states, 30 of which were deep enough to encounter the productive Prairie du Chien formation. Of these 30, BLM's Map #3 reveals that 6 wells are within the KGS area, and 5 of these are producing gas. The above data caused BLM to conclude that an extremely large structure existed in the area of the trap.

Although stressing that its KGS determination was based on more than magnetic data, BLM acknowledges the importance of aeromagnetic data in its determination. The BLM KGS report, as revised May 2, 1986, recognizes the work of Dr. Kellogg in interpreting the magnetic anomaly map of the Southern

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6/ Dr. Kellogg also states that the process of determining the configu- ration and lithology of causative bodies from gravity and magnetic maps involves

> "a double source of ambiguity because both the physical property contrasts are uncertain and little is generally known about the configu- ration of the causative bodies. Even if the physical properties are known, the configuration of the anomalous mass is still unknown except that if a prominent magnetic anomaly is present then the source resides within the basement rocks."

("Aeromagnetic Investigation of the Southern Peninsula of Michigan" at 61-64).

7/ Eastern States' review of the KGS report is dated June 9, 1986. The KGS report was prepared by the Milwaukee District Office, BLM.

Peninsula, and describes this map as a "key source of the general shape and areal extent of the field." Id. at 3. The practice of incorporating aeromagnetic data with other geologic data, BLM states, is an established methodology in the geologic community. Indeed, a firm knowledge of aero- magnetics is a basic component of a geologist's undergraduate education, BLM contends.

[1] Our review of the record and the arguments of the parties reveals that appellants have failed to establish error in BLM's actions. Appel- lants' contention that BLM's methodology lacks evidentiary support and scientific acceptance is, itself, lacking in support. The statements of Dr. Kellogg relied upon by appellants do not undermine BLM's approach in this case. Although it is plain that Dr. Kellogg urges caution in using magnetic data, he clearly states that "[d]epths obtained from aeromagnetic studies are a valuable supplement to basement drill holes in determining the configuration and topography of the basement surface." 8/ A similar conclusion attributed to L. L. Nettleton 9/ appears in the supporting documents of the KGS report:

> With adequate magnetic surveys it is often possible to deter-mine basement depths in sufficient detail for local structure on the basement surface to be reliably delineated. In addition to individual determinations of depth to the magnetic source this may involve modeling of an individual basement feature and determina- tion of its major geometric parameters. If the geological defor-mation which caused the local basement feature, either originally or by rejuvenation, is later than the time of deposition of the overlying sediments, the basement disturbance may have caused deformation of those sediments which could be a major factor in oil accumulation.

With respect to Dr. Kellogg's caution against the use of a "prominent minimum," we note that appellants do not allege the presence of such feature in the instant case and do not allege that BLM ignored Dr. Kellogg's advice. Kellogg's further caution that the greater depths of the central portion of Michigan diminishes the reliability of contours there does not, we believe, support rejection of such data. Indeed, Kellogg, at the conclusion of his thesis, states that "interpretation of aeromagnetic data is a useful tool in studying the basement geology beneath the sediments of the Michigan Basin, despite their great thickness." Id. at 124 (emphasis supplied).

Referring to its statement in the KGS report that it did not use mathe-matical simulation and computer modelling in interpreting magnetic data, BLM states that such an analysis would have narrowed the number of possible

8/ "Aeromagnetic Investigation of the Southern Peninsula of Michigan" at 47.
9/ L. L. Nettleton, Gravity and Magnetics in Oil Prospecting 395 (1976).

origins for the Newaygo-Mecosta structure, but would not have contributed to knowledge whether or not a structure exists. Finally, with respect to the suggestion by appellants and the Eastern States Office that a "kidney iron deposit" is responsible for the magnetic anomaly in question, the response of BLM's Milwaukee District Office (MDO) appears dispositive. MDO reports that the purported "kidney iron deposit" was, in fact, pieces of a drill bit that contaminated well cuttings. The basis for MDO's response was a 1908 article cited by Eastern States.

Appellants next argue that there is no readily apparent basis for BLM's conclusion that the basement high was formed after the Prairie du Chien for-mation had been deposited. It is at least as likely that it was not, appel-lants contend. If deposition occurred after the basement feature formed, appellants state, the Prairie du Chien would be at its thinnest above the basement feature.

BLM responds to this argument by noting that appellants' position is a possible interpretation of the origin of the Newaygo-Mecosta structure, but that numerous others are possible and far more likely. The KGS report did not specify the origin of the Newaygo-Mecosta structure, BLM points out, but simply stated that it was probably associated with a basement high. The structure could be a dome or series of superimposed domes, BLM notes. In support of its conclusion that the basement feature occurred after Paleozoic sediments 10/ had been deposited, BLM states:

> Kellogg's study was done at a time when crystalline base-ment material was automatically assumed to have been formed in the Precambrian. This assumption has influenced many of the conclusions about the nature and history of the Michigan Basin. We now know that granites, gneisses, and other "basement" mate- rials are not necessarily Precambrian in age. The formation of these "basement" and so-called "Precambrian" rocks are now accepted as having a vast range of ages throughout the world. It is possible that at least some of the basement features in the Michigan Basin were formed after Paleozoic sediments were being deposited.

(KGS Report at 7-8).

Appellants challenge BLM's conclusion that the basement feature formed after Prairie du Chien deposition but give no support for their view. An appellant challenging a Departmental determination that land is within a KGS of a producing oil or gas field has the burden of showing that the determi-nation is in error by a preponderance of the evidence. Bender v. Clark, 744 F.2d 1424 (10th Cir. 1984). Proof by a preponderance of the evidence is the traditional standard of proof required in a civil or administrative proceeding. Thunderbird Oil Corp., 91 IBLA 195 (1986), aff'd sub nom.

10/ The Prairie du Chien formation, having been deposited in late Cambrian or early Ordovician time, is a Paleozoic sediment.

Planet Corp. v. Hodel, CV No. 86-679 HB (D.N.M. May 6, 1987). Appellants have failed to meet this burden because their position, while possible, is unsupported by sufficient proof.

In constructing a structure map of the Prairie du Chien formation, BLM relied on available well logs, data ("picks") furnished by Petroleum Information (PI), and the aforementioned magnetic anomaly map. Appellants describe BLM's methodology as inherently uncertain because of the difficulty of finding a consistent marker horizon within the eroded Prairie du Chien formation using well logs and PI picks. Appellants also challenge BLM's use of the magnetic anomaly map in contouring because such use depends upon the correctness of several assumptions, viz., that "the hypothesized basement structure in fact exists, and that it was uplifted after, rather than before or during, Prairie du Chien deposition" (SOR at 34). See also Exh. B, filed July 19, 1988.

In response, BLM acknowledges certain difficulties in preparing its structure map, among which is the fact that the top of the Prairie du Chien formation has been eroded. To allow for this, BLM sought out a marker horizon within the Prairie du Chien on available well logs. Whether this marker horizon was similarly used by PI sources in reporting this formation was addressed by geologist Lucille Tamm in the BLM KGS report:

> The structure map on the Prairie du Chien (Map 1) presented with this paper has been created using my own pick of a feature seen on the available electric logs. This obviously creates a problem using PI data for wells in which I could not even view the electric logs - fortunately these were only a few. I have assumed, that since my pick is nearly at the top of what seems to be the Prairie du Chien, and is a consistent marker, at least to my eye, the various company geologists working in the area have probably reported a pick which is fairly close to my own. Fortunately in most cases, logs are available for nearby wells (3 to 5 miles) and show that the PI reported picks are usable and fit into the overall scheme of the structure map. The PI reported tops were used only when log data was not available.

Id. at 6.

BLM's use of magnetic data in constructing the Prairie du Chien structural map was also addressed by Tamm:

> Because the magnetic data is uniquely suited to detecting very deep seated, basement related features, and since the Prairie du Chien is so near to the basement, the magnetic map was used as a general guide for the contouring of the Prairie du Chien marker map. Exact conformance of the Prairie du Chien map and the mag- netic map, however, was not forced. Well data was considered more accurate in areas where it was available.

(Tamm Mineral Report at 9).

Though it is apparent that BLM made a number of assumptions in pre- paring its structural map of the Prairie du Chien, this fact by itself does not demonstrate error in its KGS determination. Where data is limited, assumptions will frequently be necessary. Appellants have not shown that such assumptions are erroneous or unlikely, but only that other conclusions are also possible. It is well established that this Board may rely on reports of the Secretary's technical experts. In Champlin Petroleum Co., 86 IBLA 37, 40 (1985), the Board stated that "[w]here the conclusions drawn from geological data are subject to different interpretations, the Secretary is entitled to rely upon the reasoned opinion of his technical expert in the field." We find no reason to depart from this principle in the present case.

In their final argument on appeal, appellants focus upon the following passage from the KGS report:

> This KGS is on the flank of the Mid-Michigan gravity high. * * * Fisher (1969) interprets the Mid-Michigan gravity high as representing a structural or topographic high present during Cambrian time. This feature would have had a considerable influence on deposition in this KGS's vicinity during the Cambro-Ordovician period when the Prairie du Chien was being deposited. The Mid-Michigan gravity high has been interpreted as a horst type structure inferring that it is bounded on both sides by NW-SE trending faults. In turn, this major horst system has been inter-preted as representing an incipient rift zone. The uplift of the horst would cause increased deposition of clastics on the flanks. [Emphasis supplied.]

Id. at 8. This passage is infirm in appellants' view because it over-looks an elementary consideration: uplift of the horst would contribute to deposition only if the uplift were sufficient to raise the horst above sea level. Appellants point to the Mid-Atlantic Ridge as the most familiar rift system today and note that with very few exceptions the entire length of the Mid-Atlantic Ridge lies far underwater.

In response, BLM states that appellants have apparently confused oceanic spreading centers with rift basins:

> The Mid-Atlantic Ridge is an oceanic spreading center asso- ciated with the ongoing opening of the Atlantic. The rifting which preceded the opening of the Atlantic is no longer active, although Rift Basins associated with its opening are present on both of its sides, e.g., the Baltimore Canyon Trough and the Triassic Rift Basins along the U.S. East Coast. Movement along the Mid-Atlantic Ridge is dominantly directed either east or west, and is driven by upwelling magma.

(BLM Response, Feb. 22, 1988, at 41-42). BLM further explains that the horst system associated with the Mid-Michigan gravity high produces a structural and/or topographic high, not magma extruded between fault blocks.

Appellant's subsequent pleading 11/ does not dispute BLM's distinc-tion between oceanic spreading centers and rift basins. On the basis of the evidence offered by the parties on this final issue also, therefore, it is plain that appellants have not demonstrated error by a preponderance of the evidence.

Accordingly, pursuant to the authority delegated to the Board of Land Appeals by the Secretary of the Interior, 43 CFR 4.1, the decisions of the Eastern States Office are affirmed.

Franklin D. Arness
Administrative Judge

I concur:

Bruce R. Harris
Administrative Judge

11/ Supplement to SOR, filed May 16, 1988, amended July 19, 1988.